

CLAIMS

1. Squeeze protecting device arranged to detect the presence of an object in a protection area comprising a housing and an antenna unit connected to a detecting unit, which circuit is arranged to, via said antenna unit, detect capacitive variations in an electric- or electromagnetic field at said antenna unit, **c h a r a c t e r i s e d** in that said detecting circuit comprises
5 means connected to said antenna unit arranged to detect a variation of the pressure at said antenna unit caused by compressive force applied at said housing;
10 generating means for generating an electric or electromagnetic field at the antenna unit;
15 balancing means for maintaining the generated electric or electromagnetic field at the antenna unit in a balanced condition;
filter means for preventing the detecting unit from being affected by variations in temperature and moisture;
detecting means for detecting small variations in the generated electric or electromagnetic field at the antenna unit; and
20 indication means for indicating that a variation in the electric or electromagnetic field at the antenna unit has occurred, wherein the presence of conductive as well as non-conductive objects in said protection field can be detected.
- 25 2. Squeeze protecting device arranged to detect the presence of an object in a protection field comprising a housing and an antenna unit connected to a detecting unit, which circuit is arranged to, via said antenna unit, detect capacitive variations in an electric- or electromagnetic field at said antenna unit, **c h a r a c t e r i s e d** in that said antenna unit comprises a plurality of conductive elements connected to said detecting circuit and that said detecting circuit comprises
30 means connected to said antenna unit arranged to detect a compressive force applied at said housing as a variation of the

distance between a first and a second conductive element of the antenna unit;

generating means for generating an electric or electro-magnetic field at the antenna unit;

5 balancing means for maintaining the generated electric or electromagnetic field at the antenna unit in a balanced condition;

filter means for preventing the detecting unit from being affected by variations in temperature and moisture;

10 detecting means for detecting small variations in the generated electric or electromagnetic field at the antenna unit; and

indication means for indicating that a variation in the electric or electromagnetic field at the antenna unit has occurred, wherein the presence of conductive as well as non-conductive objects in said protection field can be detected.

15 3. Squeeze protecting device according to claim 1 or 2 in combination with claim 1, characterised by that said means of the detecting circuit for detecting a variation of the pressure at the antenna unit is arranged to detect the applied compressive force as a variation of the capacitance at said antenna unit.

20 4. Squeeze protecting device according to claim 1, characterised by that said antenna unit comprises a plurality of conductive elements connected to said detecting circuit.

25 5. Squeeze protecting device according to claim 1, 4, or 5, characterised by that said means of the detecting circuit for detecting a capacitive variation at the antenna unit is arranged to detect the applied compressive force as a variation of the capacitance between a first conductive element and a second element of the antenna unit.

30 6. Squeezing unit according to claim 2, or 3, characterised in that each of said conductive elements of said antenna unit is

connected to said detecting unit via a relay, wherein said field can be directed in a desired direction by switching on or off, respectively, suitable conductive elements of the antenna unit.

- 5 7. Squeeze protecting device according to any one of claims 1-6, **c h a r a c t e r i s e d** in that said housing comprises a first isolating material and that said antenna unit comprises a second isolating material.
- 10 8. Squeeze protecting device according to claim 1 or 2, **c h a r a c t e r i s e d** in that said antenna unit has a circular cross section.
- 15 9. Squeeze protecting device according to any one of preceding claims, **c h a r a c t e r i s e d** in that masking means is arranged at a grounded object located adjacent to said squeeze protecting device, wherein a detection of said grounded object as a conductive object is avoided.
- 20 10. Squeeze protecting device according to claim 9, **c h a r a c t e r i s e d** in that said masking means comprises a conductor connected to said detecting unit arranged on the grounded object located adjacent to said squeeze protecting device, wherein the detection of said grounded object as a conductive object is avoided.
- 25 11. Squeeze protecting device according to claim 9, **c h a r a c t e r i s e d** in that said masking means comprises a conductive element connected to said antenna unit mounted at the grounded object located adjacent to said squeeze protecting device, wherein the detection of said grounded object as a conductive object is avoided.
- 30 12. Method for, at a squeeze protecting device arranged at a door, detecting the presence of an object in a protection field, which squeeze protecting device comprises a housing and an antenna unit connected to a detecting circuit, comprising the step of, via said antenna unit,

detecting capacitive variations in an electric or electro-magnetic field at said antenna unit, c h a r a c t e r i s e d by the steps of:

detecting a variation of the pressure at said antenna unit caused by a compressive force applied to said housing,

5 generating an electric or electro-magnetic field at the antenna unit;

maintaining the generated electric or electromagnetic field at the antenna unit in a balanced condition;

10 preventing the detecting unit from being affected by variations in temperature and moisture;

detecting small variations in the generated electric or electromagnetic field at the antenna unit; and

15 indicating that a variation in the electric or electromagnetic field at the antenna unit has occurred,

wherein the presence of conductive as well as non-conductive objects in said protection field can be detected.

13. Method for, at a squeeze protecting device arranged at a door, detecting the presence of an object in a protection field, which squeeze 20 protecting device comprises a housing and an antenna unit connected to a detecting circuit, comprising the step of, via said antenna unit, detecting capacitive variations in an electric or electro-magnetic field at said antenna unit, c h a r a c t e r i s e d by the steps of:

detecting a variation of the distance between a first and a 25 second conductive element of said antenna unit;

generating means for generating an electric or electro-magnetic field at the antenna unit;

maintaining the generated electric or electromagnetic field at the antenna unit in a balanced condition;

30 preventing the detecting unit from being affected by variations in temperature and moisture;

detecting small variations in the generated electric or electromagnetic field at the antenna unit; and

indicating that a variation in the electric or electromagnetic field at the antenna unit has occurred,
wherein the presence of conductive as well as non-conductive objects in said protection field can be detected.

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14. Method according to claim 12, characterised by the step of detecting the compressive force applied to said housing as a variation of the distance between a first and a second conductive element of said antenna unit.

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15. Method according to claim 12, 13, or 14, characterised by the step of directing said field in a desired direction by switching in or off, respectively, suitable conductive elements.

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16. Method according to any one of preceding claims, characterised by the step of masking a grounded object located adjacent to said squeeze protecting device, wherein a detection of said grounded object as a conductive object is avoided.

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17. Method according to claim 16, characterised in that said step of masking comprises the step of arranging a conductor connected to said detecting unit on the grounded object located adjacent to said squeeze protecting device, wherein the detection of said grounded object as a conductive object is avoided.

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18. Method according to claim 16, characterised in that said step of masking comprises the step of mounting a conductive element connected to said antenna unit at the grounded object located adjacent to said squeeze protecting device, wherein the detection of said grounded object as a conductive object is avoided.

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19. Contact rail provided with a squeeze protecting device arranged to detect the presence of an object in a protection field comprising a

housing and an antenna unit connected to a detecting unit, which circuit is arranged to, via said antenna unit, detect capacitive variations in an electric- or electro-magnetic field at said antenna unit, characterised by the squeeze protecting device according to any one of claims 1-11.

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20. System for detecting the presence of an object in a protection field, comprising a contact rail for mounting at an automatic door and a detecting circuit connected to an antenna unit arranged in said rail, which circuit is arranged to, via said antenna unit, detect capacitive variations in an electric- or electro-magnetic field at said antenna unit, characterised in that said detecting circuit comprises:

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means connected to said antenna unit arranged to detect a variation of the pressure at said antenna unit caused by compressive force against said housing;

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generating means for generating an electric or electro-magnetic field at the antenna unit;

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balancing means for maintaining the generated electric or electromagnetic field at the antenna unit in a balanced condition;

filter means for preventing the detecting unit from being affected by variations in temperature and moisture;

detecting means for detecting small variations in the generated electric or electromagnetic field at the antenna unit; and

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indication means for indicating that a variation in the electric or electromagnetic field at the antenna unit has occurred, wherein the presence of conductive as well as non-conductive object in said protection field can be detected.

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21. System for detecting the presence of an object in a protection field comprising a contact rail for mounting at an automatic door and a detecting circuit connected to an antenna unit arranged in said rail, which circuit is arranged to, via said antenna unit, detect capacitive variations in an electric- or electro-magnetic field at said antenna unit,

characterised in that said that said antenna unit comprises a plurality of conductive elements connected to said detecting circuit and that said detecting circuit comprises:

means connected to said antenna unit arranged to detect a compressive force applied at said housing as a variation of the distance between a first and a second conductive element of the antenna unit;

generating means for generating an electric or electromagnetic field at the antenna unit;

balancing means for maintaining the generated electric or electromagnetic field at the antenna unit in a balanced condition;

filter means for preventing the detecting unit from being affected by variations in temperature and moisture;

detecting means for detecting small variations in the generated electric or electromagnetic field at the antenna unit; and

indication means for indicating that a variation in the electric or electromagnetic field at the antenna unit has occurred, wherein the presence of conductive as well as non-conductive object in said protection field can be detected.

22. System for detecting the presence of an object in a protection field according to claim 20 or 21, comprising a first contact rail according to claim 19 mounted at an automatic door and a second contact rail according to claim 19 mounted on a grounded object located adjacent to said automatic door, wherein the detecting means are synchronized in order to provide identical signals such that a detection of said grounded object as a conductive object is avoided.